

WHAT IS CLAIMED IS:

- 1 1. A composition for the preparation of microcups used in a liquid crystal
2 display which composition comprises a thermoplastics, a thermoset or a precursor
3 thereof and liquid crystals.
- 1 2. The composition of Claim 1 which is an embossable composition.
- 1 3. The composition of Claim 1 wherein the liquid crystal has a
2 concentration no greater than its solubility limit in the microcup composition.
- 1 4. The composition of Claim 1 wherein said thermoplastic, thermoset or
2 precursor thereof is a multifunctional acrylate or methacrylate, vinyl ether, epoxide
3 and an oligomer or polymer thereof.
- 1 5. A composition for the preparation of microcups used in a liquid crystal
2 display which composition comprises a thermoplastics, a thermoset or a precursor
3 thereof and a speed enhancing comonomer or oligomer.
- 1 6. The composition of Claim 5 which is an embossable composition.
- 1 7. The composition of Claim 5 wherein said speed enhancing
2 comonomer or oligomer comprises a poly(ethylene glycol) or poly(propylene glycol)
3 moiety.
- 1 8. The composition of Claim 7 wherein said poly(ethylene glycol) or
2 poly(propylene glycol) moiety is poly(ethylene glycol) monoacrylate, poly(ethylene
3 glycol) monomethacrylate, poly(ethylene glycol) diacrylate, poly(ethylene glycol)
4 dimethacrylate, poly(propylene glycol) monoacrylate, poly(propylene glycol)
5 monomethacrylate, poly(propylene glycol) diacrylate or poly(propylene glycol)
6 dimethacrylate.

1 9. The composition of Claim 5 wherein said thermoplastic, thermoset or
2 precursor thereof is a multifunctional acrylate or methacrylate, vinyl ether, epoxide
3 and an oligomer or polymer thereof.

1 10. A liquid crystal display comprising two or more layers of microcup
2 array wherein said microcups are formed from a composition comprising a
3 thermoplastics, a thermoset or a precursor thereof and liquid crystals.

1 11. The liquid crystal display of Claim 10 wherein the liquid crystal has a
2 concentration no greater than its solubility limit in the microcup composition.

1 12. The liquid crystal display of Claim 10 wherein said thermoplastic,
2 thermoset or precursor thereof is a multifunctional acrylate or methacrylate, vinyl
3 ether, epoxide and an oligomer or polymer thereof.

1 13. The liquid crystal display of Claim 10 wherein said two or more layers
2 of microcup array are arranged in a staggered manner.

1 14. A liquid crystal display comprising two or more layers of microcup
2 array wherein said microcups are formed from a composition comprising a
3 thermoplastics, a thermoset or a precursor thereof and a speed enhancing
4 comonomer or oligomer.

1 15. The liquid crystal display of Claim 14 wherein said speed enhancing
2 comonomer or oligomer comprises a poly(ethylene glycol) or poly(propylene glycol)
3 moiety.

1 16. The liquid crystal display of Claim 15 wherein said poly(ethylene
2 glycol) or poly(propylene glycol) moiety is poly(ethylene glycol) monoacrylate,
3 poly(ethylene glycol) monomethacrylate, poly(ethylene glycol) diacrylate,
4 poly(ethylene glycol) dimethacrylate, poly(propylene glycol) monoacrylate,

5 poly(propylene glycol) monomethacrylate, poly(propylene glycol) diacrylate or
6 poly(propylene glycol) dimethacrylate.

1 17. The liquid crystal display of Claim 14 wherein said thermoplastic,
2 thermoset or precursor thereof is a multifunctional acrylate or methacrylate, vinyl
3 ether, epoxide and an oligomer or polymer thereof.

1 18. The liquid crystal display of Claim 14 wherein said two or more layers
2 of microcup array are arranged in a staggered manner.

1 19. A process for the manufacture of a liquid crystal display of more than
2 one layer of microcup array, which process comprises:

3 a) preparing separately two layers of microcup array, each on a
4 conductor film; and

5 b) laminating one of the layers over the other optionally with an
6 adhesive layer.

1 20. The process of Claim 19 wherein said microcups are prepared from a
2 composition comprising a thermoplastics, a thermoset or a precursor thereof and
3 liquid crystals.

1 21. The process of Claim 19 wherein said microcups are prepared from a
2 composition comprising a thermoplastics, a thermoset or a precursor thereof and a
3 speed enhancing comonomer or oligomer.

1 22. The process of Claim 20 wherein step (a) is carried out by forming
2 microcups over a conductor film, filling said microcups with a liquid crystal
3 composition optionally comprising a guest dye and sealing the filled microcups with
4 a polymeric sealing layer.

1 23. The process of Claim 21 wherein step (a) is carried out by forming
2 microcups over a conductor film, filling said microcups with a liquid crystal

3 composition optionally comprising a guest dye and sealing the filled microcups with
4 a polymeric sealing layer.

1 24. The process of Claim 20 wherein step (b) is carried out by laminating
2 one layer of the microcups over the other layer with the sealing sides of the two
3 layers facing each other.

1 25. The process of Claim 21 wherein step (b) is carried out by laminating
2 one layer of the microcups over the other layer with the sealing sides of the two
3 layers facing each other.

1 26. The process of Claim 20 wherein one or both layers of microcup
2 array is a full-color array prepared by a process comprising (i) laminating or coating
3 said microcup array with a positively working photoresist, (ii) imagewise exposing
4 and developing the positive photoresist to open microcups in a predetermined
5 area, (iii) filling the opened microcups with a liquid crystal composition optionally
6 containing guest dye(s) of a first primary color, (iv) sealing the filled microcups and
7 (v) repeating the steps (ii)-(iv).

1 27. The process of Claim 21 wherein one or both layers of microcup
2 array is a full-color array prepared by a process comprising (i) laminating or coating
3 said microcup array with a positively working photoresist, (ii) imagewise exposing
4 and developing the positive photoresist to open microcups in a predetermined
5 area, (iii) filling the opened microcups with a liquid crystal composition optionally
6 containing guest dye(s) of a first primary color, (iv) sealing the filled microcups and
7 (v) repeating the steps (ii)-(iv).

1 28. A process for the preparation of a liquid crystal display of more than
2 one layer of microcup array, which process comprises:

- 3 a) forming a first layer of microcups on a conductor film;
- 4 b) forming a second layer of microcups on a transfer release substrate;

- 5 c) laminating said second layer over said first layer and removing said
6 transfer release substrate;
7 d) optionally forming separately additional layers of microcups on
8 transfer release substrates;
9 e) laminating said additional layers over the top layer in a stack of layers
10 already formed and removing the transfer release substrates; and
11 f) laminating a second conductor film over the top most layer of said
12 stack.

1 29. The process of Claim 28 wherein said microcups are prepared from a
2 composition comprising a thermoplastics, a thermoset or a precursor thereof and
3 liquid crystals.

1 30. The process of Claim 28 wherein said microcups are prepared from a
2 composition comprising a thermoplastics, a thermoset or a precursor thereof and a
3 speed enhancing comonomer or oligomer.

1 31. The process of Claim 29 wherein step (a) is carried out by forming
2 microcups on a conductor film, filling said microcups with a liquid crystal
3 composition optionally comprising a guest dye and sealing the filled microcups with
4 a polymeric sealing layer.

1 32. The process of Claim 30 wherein step (a) is carried out by forming
2 microcups on a conductor film, filling said microcups with a liquid crystal
3 composition optionally comprising a guest dye and sealing the filled microcups with
4 a polymeric sealing layer.

1 33. The process of Claim 29 wherein steps (b) and (d) are carried out by
2 forming microcups on said transfer release layer, filling said microcups with a liquid
3 crystal composition optionally comprising a guest dye and sealing the filled
4 microcups with a polymeric sealing layer.

1 34. The process of Claim 30 wherein steps (b) and (d) are carried out by
2 forming microcups on said transfer release layer, filling said microcups with a liquid
3 crystal composition optionally comprising a guest dye and sealing the filled
4 microcups with a polymeric sealing layer.

1 35. The process of Claim 29 wherein step (c) is carried out by laminating
2 said second layer over said first layer with the sealing sides of the two layers facing
3 each other, followed by removing said transfer release substrate.

1 36. The process of Claim 30 wherein step (c) is carried out by laminating
2 said second layer over said first layer with the sealing sides of the two layers facing
3 each other, followed by removing said transfer release substrate.

1 37. The process of Claim 29 wherein step (e) is carried out by laminating
2 said additional layers over the top layer in said stack of layers already formed, with
3 the sealing sides of the additional layers facing the layers underneath, followed by
4 removing said transfer release substrates.

1 38. The process of Claim 30 wherein step (e) is carried out by laminating
2 said additional layers over the top layer in said stack of layers already formed, with
3 the sealing sides of the additional layers facing the layers underneath, followed by
4 removing said transfer release substrates.

1 39. The process of Claim 29 wherein step (f) is carried out by lamination
2 with or without an adhesive layer.

1 40. The process of Claim 30 wherein step (f) is carried out by lamination
2 with or without an adhesive layer.

1 41. The process of Claim 29 wherein said microcup array in step (a), (b),
2 (d) or a combination thereof is a full-color array prepared by a process comprising
3 (i) laminating or coating said microcup array with a positively working photoresist,

4 (ii) imagewise exposing and developing the positive photoresist to open microcups
5 in a predetermined area, (iii) filling the opened microcups with a liquid crystal
6 composition optionally containing guest dye(s) of a first primary color, (iv) sealing
7 the filled microcups and (v) repeating the steps (ii)-(iv).

1 42. The process of Claim 30 wherein said microcup array in step (a), (b),
2 (d) or a combination thereof is a full-color array prepared by a process comprising
3 (i) laminating or coating said microcup array with a positively working photoresist,
4 (ii) imagewise exposing and developing the positive photoresist to open microcups
5 in a predetermined area, (iii) filling the opened microcups with a liquid crystal
6 composition optionally containing guest dye(s) of a first primary color, (iv) sealing
7 the filled microcups and (v) repeating the steps (ii)-(iv).

1 43. A process for the manufacture of a liquid crystal display of more than
2 one layer of microcup array, which process comprises:

- 3 a) preparing a first layer of microcup array on a first conductor film;
- 4 b) preparing a second layer of microcup array on top of the first layer;
- 5 c) optionally preparing additional layers of microcup array on top of a
6 stack of layers already formed; and
- 7 d) laminating a second conductor film on top of the top most layer of
8 microcup array, optionally with an adhesive layer.

1 44. The process of Claim 43 wherein said microcups are prepared from a
2 composition comprising a thermoplastics, a thermoset or a precursor thereof and
3 liquid crystals.

1 45. The process of Claim 43 wherein said microcups are prepared from a
2 composition comprising a thermoplastics, a thermoset or a precursor thereof and a
3 speed enhancing comonomer or oligomer.

1 46. The process of Claim 44 wherein steps (a), (b) and (c) are carried out
2 by forming microcups over a conductor film, filling said microcups with a liquid

3 crystal composition optionally comprising a guest dye and sealing the filled
4 microcups with a polymeric sealing layer.

1 47. The process of Claim 45 wherein steps (a), (b) and (c) are carried out
2 by forming microcups over a conductor film, filling said microcups with a liquid
3 crystal composition optionally comprising a guest dye and sealing the filled
4 microcups with a polymeric sealing layer.

1 48. The process of Claim 44 wherein said microcup array in step (a), (b),
2 (c) or a combination thereof is a full-color array prepared by a process comprising
3 (i) laminating or coating said microcup array with a positively working photoresist,
4 (ii) imagewise exposing and developing the positive photoresist to open microcups
5 in a predetermined area, (iii) filling the opened microcups with a liquid crystal
6 composition optionally containing guest dye(s) of the a primary color, (iv) sealing
7 the filled microcups and (v) repeating the steps (ii)-(iv).

1 49. The process of Claim 45 wherein said microcup array in step (a), (b),
2 (c) or a combination thereof is a full-color array prepared by a process comprising
3 (i) laminating or coating said microcup array with a positively working photoresist,
4 (ii) imagewise exposing and developing the positive photoresist to open microcups
5 in a predetermined area, (iii) filling the opened microcups with a liquid crystal
6 composition optionally containing guest dye(s) of the a primary color, (iv) sealing
7 the filled microcups and (v) repeating the steps (ii)-(iv).